

GROWTH SCENARIO OF CHILLI CULTIVATION IN KARNATAKA

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ABSTRACT

The analysis of growth is usually used in economic studies to find out the trend of a particular variable over a period of time and used for making policy decisions. The growth in the area, production and productivity of chilli in India, Karnataka and the districts of Karnataka was estimated using the compound growth function. The necessary secondary data was also collected with regard to area, production and productivity of chilli for the past 15 years (1998-99 to 2013-14) to understand the status of chilli production at national, state level and study districts. The data for all the districts of Karnataka (HK and NHK region) with regard to area, production and productivity of chilli is restricted for 10 years (2003-04 to 2013-14). Compound Annual Growth Rate (CAGR) of area in India was decreasing and that of production was increasing which were statistically significant.

KEYWORDS: *HK and Non HK Region–Hyderabad Karnataka and Non-Hyderabad Karnataka*

INTRODUCTION

Chilli (*Capsicum annum* L.), also called red pepper, is an important cash crop in India belonging to the family of Solanaceae, and is grown for its pungent fruits. These fruits are small in size and are known for their sharp acidic flavour and colour which are used as both green and ripe (the latter in the dried form) to impart pungency to the food. As a condiment, it has become indispensable in every Indian home. It is also used medicinally, as it is rich in vitamins A, C and E, and in chutneys and pickles. The Pungency is due to the active principle 'capsaicin' contained in the skin and the septa of the fruit. The world consumption of green chillies and paprika is going up due to the increasing popularity of ethnic foods. India is the largest producer of green chillies in the world but its production pattern is highly erratic. The world production of Chilli crop sums to around 7 million tonnes cultivated on 1.5 million hectares. Asian countries have the bulk share of Chilli production. India is the leading producer of Chilli, with the annual production of 1.1 million tons. It is also the largest exporter of Chilli and contributes to ¼th share in the total Chilli exported in the world. The major Chilli area is in Andhra Pradesh, Karnataka, Maharashtra, Punjab, Tamil Nadu and Rajasthan. These states contribute to around 86 percent of total Chilli production in the country and 90 percent of the total chilli production in India.

The basic idea is to study the growth in the area, production and productivity of chilli in India, Karnataka and the districts of Karnataka with the help of compound growth function. Andhra Pradesh is the leading Chilli-producing state in

India and also constitutes the maximum acreage for Chilli cultivation in the country. It accounts 25 percent of the Indian total production and produces around 2.7 lakh tonnes of green chillies.

In a recent study by Sathish et al. (2015), it was reported that area in both Andhra Pradesh & Telangana was in a decreasing trend in relation to an area, whereas production and productivity were increasing. It was also duly noted that production of chilli showed the highest degree of instability compared to area and productivity. Sarada et al. (2015), the study indicated the impact of weather conditions on production and productivity of chilli in Guntur district of Andhra Pradesh and may help in developing forecasting models based on climatic conditions. Rao and Reddy (2005) worked out the growth rates of area, production and productivity of groundnut for the period I (1988-89 to 2002-03) and period II (1953-56 to 2002-03) in the three geographical regions of Andhra Pradesh and also Andhra Pradesh state as a whole. The compound growth rate of the area is significant only in Rayalaseema, production is significant in all three regions and Andhra Pradesh state as a whole and productivity is significant in Coastal Andhra and Andhra Pradesh state as a whole.

Karnataka is the second largest producer of Chilli in India next only to Andhra Pradesh. Karnataka's share is 14 percent of the total Chilli production in the country which accounts for 1.54 lakh tonnes. The Major Chilli growing districts in Karnataka are Dharwad, Gadag, Haveri, Kolar, Ballari and Raichur.

MATERIALS AND METHODS

Multistage sampling method was adopted for the study. At the first stage, based on the concentration of area under dry chilli one from the contract farming firm. In the second stage, a cluster of villages participating in contract farming was chosen. Finally, based on the farmer's details maintained by the firm 60 contract farmers were selected. An equal number of sample farmers who are not participating in contract farming but growing dry chilli were also selected from the same locality to compare and contrast. Thus, the total sample size of the study was 120 respondents. Primary data were obtained from the selected farmers using pre-tested schedule through personal interview for evaluating the objectives of the study. The information elicited pertaining to cropping pattern, land holdings, asset position, family size; educational level, input use and output realized were collected. Further, the data on the quantity of produce sold the price of inputs and marketing practices followed were collected from the sample farmers. Farmer's opinion about contract farming and the problems faced by them were also recorded. In addition, secondary data was also collected with regard to area, production and productivity of chilli for the past 15 years (1998-99 to 2013-14) to understand the status of chilli production at national, state level and study districts. The data for all the districts of Karnataka (HK and NHK region) with regard to area, production and productivity of chilli is restricted for 10 years (2003-04 to 2013-14) to understand the status of chilli production at national, state level and study districts.

In order to assess the growth in area, production and yield of chilli the compound growth rates were computed by using the exponential function of the form.

$$Y_t = AB_t U_t \quad \dots\dots\dots (1)$$

Where,

Y_t = Area, production and productivity of chilli and cotton

$t = 1, 2, \dots\dots\dots n$ years

U_t = Disturbance term in year “t”

“a” and “b” are the parameters to be estimated

The equation (1) was transformed into log linear form and written as

$$\text{Log } Y = \log A + t \log B + \log U_t \quad \dots\dots\dots (2)$$

Equation (2) was estimated by using ordinary least squares (OLS) technique.

Compound growth rate (g) was then estimated by using the relationship given in equation (3).

$$g^{\wedge} = (b^{\wedge} - 1) * 100 \quad \dots\dots\dots (3)$$

Where,

g^{\wedge} = Estimated compound growth rate percent per annum

b^{\wedge} = Antilog of B

The standard error of the growth rate was estimated and tested for its significance with ‘t’ statistics.

RESULTS AND DISCUSSIONS

Chilli is one of the important commercial crops of India and Karnataka. In the recent years, there was fluctuation in the production as well as quality of produce due to change in climate. The fluctuation in the production was also due to the variation in prices and lack of proper marketing infrastructure. To assess this, an attempt has been made to study the growth in area, production and productivity of chilli at all India level, state and regional level.

The Growth and instability of chilli production at different levels indicate the sustainability of crop production across regions with the changing climate as well as market situations. Hence, secondary data were collected for India, Karnataka, H-K and NHK region and for the study district.

Accordingly, the growth and instability of chilli production in India, Karnataka and regions of Karnataka are presented in the following paragraphs.

The Table 1 reveals that the average area under chilli in India in the last 15 years (1998-99 to 2013-14) was 8.27 lakh ha of which the share of Karnataka was 15.18 percent. On an average the production of chilli at all India level was 10.94 lakh tonnes with a productivity of 1.34 tonnes/ha. The average production of Karnataka was 1.27 lakh tonnes with the productivity of 1.05 tonnes/ha.

The instability in production of chilli was found to be higher at all India (22.00 %) when compared to Karnataka (20.00 %). It was also observed from the table that the variation in productivity was higher at all India level (27.00 %) when compared to area (9.00 %). As shown in the Table 1, Compound Annual Growth Rate (CAGR) of area in India was decreasing by 0.93 percent and that of production was increasing at 2.13 percent which were statistically significant. The CAGR of area and production in Karnataka was decreasing by 2.36 percent and 0.56 percent respectively which was statistically non-significant. In case of productivity, negative trend (2.98 %) was observed for India which was statistically significant unlike Karnataka (1.84 %).

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productivity of 1.34 tonnes/ha. The average production of Karnataka was 1.27 lakh tonnes with the productivity of 1.05 tonnes/ha. The productivity of chilli was less than national average this calls for the attention of extension agencies for better transfer of technology and also the farmers need to adopt the HYVs.

The instability in chilli production was found to be little higher at all India level compared to Karnataka as indicated by their CV values. This may probably due to higher variation in the productivity level at all India level (27.00 %) compared to Karnataka (9.00 %). Compound Annual Growth Rate (CAGR) of area under chilli for India as a whole was decreasing by 0.93 percent and that of production has increased at 2.13 percent which were statistically significant. It was astonishing to note that though area and productivity were decreasing at all India level but the growth in production was increasing. The CAGR of area and production in Karnataka was decreasing by 2.36 percent and 0.56 percent, respectively which are statistically non-significant but the productivity was increasing. Similar results were quoted in the studies of Bhullar (2005) and Vishweshwar (2005).

The Table 2 reveals that the average area and production under chilli in HK region was 76.27 thousand ha and that of non HK region was 48.10 thousand ha. The production of chilli in HK region was 82.47 thousand tonnes which contribute 64.52 percent to total production of the state with a productivity of 0.92 tonnes/ha. The average production of non-HK region was 44.53 thousand tonnes contributing 34.83 percent to total production of the state with productivity of 1.08 tonnes/ha. The productivity of HK-region (0.92 tonnes/ha) was less than NHK region (1.08 tonnes/ha)

The instability in area (69.00 %) and production (65.00 %) of chilli was found to be higher in non HK region when compared to 44 percent in area and 28 percent in production of H-K region. It was also observed from the table that the variation in productivity was higher in HK region (21.00 %) when compared to non HK region (15.00 %).

As shown in the table, CAGR of area in HK region and non-HK region was decreasing by 2.90 percent and 2.80 percent, respectively but statistically non-significant. The CAGR of production in both the areas was decreasing at 4.30 percent and 3.08 percent respectively. Unlike area and production the CAGR in productivity was increasing at 1.98 percent and 0.28 percent respectively during the same period which are statistically non-significant.

It was observed from the Table 4.2 that CAGR of area under chilli in HK region and non-HK region has decreased by 2.90 percent and 2.80 percent, respectively but statistically non-significant. The CAGR of production in both the regions was decreased at 4.30 percent and 3.08 percent respectively. It was obvious that the decline in production was due to both declines in area as well as productivity in both the regions. The results were in contradictory with Balappa *et al* (1999).

It is observed from the Table 3 that the CAGR in production is decreasing in India (0.93 %), Karnataka (2.36 %) and Ballari (3.44 %) and statistically significant in India and Ballari. In case of production it was increasing in India (2.13 %) and statistically significant but decreasing in both Karnataka (0.56 %) and Ballari (4.82 %). Whereas in case of productivity, it was decreasing in India (2.98) but increasing in Karnataka (1.84) and Ballari (0.71)

It was evident from Table 4.3 that CAGR of production was negative for India (0.93 %), Karnataka (2.36 %) and the study district Bellary (3.44 %) and growth rates were statistically significant for India and Bellary. In case of production, it was positive (2.13 %) and statistically significant for India but for Karnataka (0.56 %) and Ballari (4.82 %), the growth rates were negative. Similar results were quoted in the study conducted by Sikka and Vaidya (2011). In Karnataka state, majority of the districts had the growth rates of area, production and productivity of chilli below the state average.

It was observed from Table 4, that the districts like Bagalkot, Bangalore rural, Belugum, Ballari, Vijayapura, Chitradurga, Dakshin Kannada, Davangere, Dharwad, Gadag, Haveri, Kodagu, Kolar, Koppal, Mandhya, Mysore, Shimoga, Tumkur and Udupi showed declining trend in growth, whereas in districts like Bangalore urban, Bidar, Chamarajnagar, Chikkamagalur, Kalaburgi, Hasan, Raichur and Uttar Kannada growth rate in area was tend to be positive.

The growth rate in production declined in districts like Bagalkot, Bangalore rural, Belugum, Bidar, Vijayapura, Ballari, Chitradurga, Dakshin Kannada, Davangere, Dharwad, Gadag, Haveri, Mysore, Raichur, Shimoga, Tumkur and Udupi. Whereas it showed increasing trend in districts like Bangalore urban, Chamarajnagar, Chikkamagalur, Gulbarga, Hasan, Kodagu, Kolar, Koppal, Mandhya and Uttar Kannada.

Even though the growth rate in area and production was decreasing in most of the districts the growth in productivity was increasing in the districts like Bagalkot, Bangalore rural, Bangalore urban, Belugum, Ballari, Vijayapura, Chamaraj Nagar, Chikkamagalur, Chitradurga, Dakshin Kannada, Davangere, Dharwad, Gadag, Gulbarga, Hasan, Haveri, Mysore, Shimoga, Tumkur, Udupi and Uttar Kannada.

It is observed from the Table 5 that the districts which comes under above state average growth in area (-2.36) were Bagalkot, Bangalore rural, Bangalore urban, Belugum, Bidar, Vijayapura, Chamaraj Nagar, Chikkamagalur, Chitradurga, Dakshin Kannada, Davangere, Dharwad, Gadag, Gulbarga, Hasan, Haveri, Kodagu, Kolar, Koppal, Mandhya, Mysore, Raichur, Shimoga, Tumkur, Udupi, Uttar Kannada and Ballari is the only district which had a growth rate below state average.

In production, Bangalore urban, Chamaraj Nagar, Chikkamagalur, Gulbarga, Hasan, Kodagu, Kolar, Koppal, Mandhya, Uttar Kannada these districts comes under above state average growth rate and Bagalkot, Bangalore Rural, Belgavi, Bidar, Vijayapura, Ballari, Chitradurga, Dakshin Kannada, Davangere, Dharwad, Gadag, Haveri, Mysore, Raichur, Shimoga, Tumkur, and Udupi had growth rate of below state average (-0.56)

Shimoga, Udupi and Uttar Kannada falls above state average growth in productivity (1.84) and Bagalkot, Bangalore rural, Bangalore urban, Belugum, Bidar, Vijayapura, Chamaraj Nagar, Chikkamagalur, Chitradurga, Dakshin Kannada, Davangere, Dharwad, Gadag, Gulbarga, Hasan, Haveri, Kodagu, Kolar, Koppal, Mandhya, Mysore and Raichur had growth rate of below state average productivity.

It was clear from the above discussion that the production of chilli in Karnataka state as a whole was declining and for majority of the districts in the State had growth rates below the state average. Hence, the decline in the production was due to both declines in area as well as productivity. At all India level there was a positive and significant growth in production of chilli though there was negative growth in area as well as productivity indicating better performance of existing varieties in maintaining the production.

Table 1: Growth and Instability of Chilli Production in India and Karnataka in Last 15 Years (1998-99 to 2013-14)

Sl. No	Particular	India	Karnataka
1	Average area ('000 Ha)	827.49(100.00)	125.67(15.18)
2	Average production('000 MT)	1093.96(100.00)	126.56(11.56)
3	Average productivity (tonnes/ha)	1.34	1.05
4	Std deviation in area	75.33	39.46
5	Std deviation in production	24.98	26.24
6	Std deviation in productivity	0.36	0.21
7	CV of area (%)	09.00	31.00

8	CV of production (%)	22.00	20.00
9	CV of Productivity (%)	27.00	19.00
10	Compound growth rate of area (%)	-0.93*	-2.36 ^{NS}
11	Compound growth rate of production (%)	2.13***	-0.56 ^{NS}
12	Compound growth rate of productivity (%)	-2.98***	1.84 ^{NS}

Figures in parentheses indicates percent to total

* Significant at 10 percent

***Significant at 1 percent

NS- Non significant

Table 2: Growth and Instability of Chilli Production in HK and Non HK Region

Sl. No	Particulars	HK Region	NHK Region	Total
1	Average area ('000 Ha)	76.27(61.33)	48.10(38.67)	124.37(100.00)
2	Average production ('000 MT)	82.47(64.52)	44.53(34.83)	127.82(100.00)
3	Average productivity (tonnes/ha)	0.92	1.08	0.97
4	Std deviation in area	42.73	40.56	38.12
5	Std deviation in production	26.58	35.58	23.86
6	Std deviation in productivity	0.22	0.16	0.18
7	CV of area (%)	44.00	69.00	24.00
8	CV of production (%)	28.00	65.00	16.00
9	CV of Productivity (%)	21.00	15.00	15.00
10	Compound growth rate of area (%)	-2.90 ^{NS}	-2.80 ^{NS}	-2.36 ^{NS}
11	Compound growth rate of production (%)	-4.30 *	-3.08 ^{NS}	-5.6 ^{NS}
12	Compound growth rate of productivity (%)	1.98 ^{NS}	0.28 ^{NS}	1.84 ^{NS}

Figures in parentheses indicates percent to total

* Significant at 10 percent

***Significant at 1 percent

NS- Non significant

Table 3: Growth in Chilli Production in India, Karnataka and Study District(15 Years)

Sl. No	Particulars	India	Karnataka	Ballari
1	Compound annual growth rate in area (%)	-0.93*	-2.36 ^{NS}	-3.44*
2	Compound annual growth rate in production (%)	2.13***	-0.56 ^{NS}	-4.82
3	Compound annual growth rate in productivity (%)	-2.98***	1.84 ^{NS}	0.71**

Table 4: District-Wise Growth in Area, Production and Productivity of Chilli in Karnataka

Districts	Area	Production	Productivity
Bagalkot	-1.36	-1.43	0.94
Bangalore rural	-1.04	-1.84	0.60
Bangalore urban	1.48	0.87	1.30
Belgum	-1.81	-7.08	0.25
Ballari	-3.44	-4.82	0.71
Bidar	.010	-1.00	-9.93
Vijayapura	-1.83	-3.25	0.25
ChamarajNagar	1.28	1.07	1.19
Chikkamagalur	.62	0.90	0.69
Chitradurg	-.38	-0.80	0.47
Dakshin Kannada	-.84	-0.81	1.03
Davangere	-2.27	-2.75	0.82
Dharwad	-1.12	-2.02	0.55
Gadag	-1.71	-1.35	1.27
Gulbarga	1.13	3.20	0.35

Hasan	0.78	2.12	0.36
Haveri	-1.95	-1.49	1.30
Kodagu	-1.21	1.16	-1.04
Kolar	-0.62	0.43	-1.45
Koppal	-0.79	0.30	-2.58
Mandhya	-0.09	0.15	-0.61
Mysore	-0.36	-1.82	0.20
Raichur	1.05	-0.84	-1.26
Shimoga	-2.11	-0.74	2.86
Tumkur	-1.21	-4.71	0.25
Udupi	-1.14	-0.61	1.86
Uttar Kannada	2.28	1.19	1.91

Table 5: Classification of Districts Based on Growth Rate

Sl. No	Category	Districts
1	Above state average growth in area (-2.36)	Bagalkot, Bangalore rural, Bangalore urban, Belgum, Bidar, Vijayapura, Chamarajnagar, Chikkamagalur, Chitradurga, Dakshin Kannada, Davangere, Dharwad, Gadag, Gulbarga, Hasan, Haveri, Kodagu, Kolar, Koppal, Mandhya, Mysore, Raichur, Shimoga, Tumkur, Udupi, Uttar Kannada.
2	Below state average growth in area (-2.36)	Ballari.
3	Above state average growth in Production(-0.56)	Bangalore urban, ChamarajNagar, Chikkamagalur, Gulbarga, Hassan, Kodagu, Kolar, Koppal, Mandhya, Uttar Kannada
4	Below state average growth in Production (-0.56)	Bagalkot, Bangalore rural, Belgum, Bidar, Vijayapura, Ballari, Chitradurga, Dakshin Kannada, Davangere, Dharwad, Gadag, Haveri, Mysore, Raichur, Shimoga, Tumkur, Udupi.
5	Above state average growth in productivity (1.84)	Shimoga, Udupi, Uttar Kannada
6	Below state average growth in productivity (1.84)	Bagalkot, Bangalore rural, Bangalore urban, Belgum, Bidar, Vijayapura, ChamarajNagar, Chikkamagalur, Chitradurga, Dakshin Kannada, Davangere, Dharwad, Gadag, Gulbarga, Hasan, Haveri, Kodagu, Kolar, Koppal, Mandhya, Mysore, Raichur,

REFERENCES

1. BalappaShivaraya, Hugar, L. B. and Olekar, J. N. 1999. Growth performance of redgram in Karnataka state. *An Agricultural Banker* 23(1): 3033.
2. Bhullar, A. S. 2005. Estimating, export competitiveness of chillies from Punjab state. *Agricultural Marketing*36(5): 43.
3. Sikka, B. K. and Vaidya, C. S. 2011. Growth rates and cropping pattern changes in agriculture in Himachal Pradesh, *Agricultural Situation in India* 39(11): 843841.
4. Vishweshwar, S. P. 2005. Economics of hybrid cotton with special reference to pest management in Malaprabha command area. M.Sc. (Agri.) Thesis, University of Agricultural Sciences, Dharwad (Unpublished).
5. www.indiastat.com.

6. Sathish, G., Supriya, K., Bhave, M. H. V, & Venkatesh, P. (2015). *An Analysis of Growth Trends and Instability of Chilli in Andhra Pradesh. Research Journal of Agricultural Sciences*, 6(December), 1753–1756.
7. Sarada, C., Ratnam, M., Naidu, L. N., Ramana, C. V., Rajani, A., & Vijaya, T. (2015). *Chilli production and productivity in relation to Seasonal weather conditions in Guntur District of Andhra Pradesh. International Journal of Pure & Applied Bioscience*, 3(1), 207–213.
8. Rao, K.V. and Reddy, M.D. 2005. *Status of groundnut in Telangana – A case study. Journal of the Indian Society of Agricultural Statistics*. 59(1): 33.